



Department of Defense

**DEPOT MAINTENANCE
CAPACITY AND UTILIZATION
MEASUREMENT HANDBOOK**

January 1997

**Office of the Under Secretary of Defense
for Acquisition and Technology**



OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON DC 20301-3000

January 24, 1997

FOREWORD

This Handbook is issued under the authority of DoD Directive 4151.18, "Maintenance of Military Materiel," August 12, 1992. Its purpose is to provide updated guidance for a common methodology to measure and provide visibility of the capacity and utilization of DoD organic depot maintenance activities that perform depot-level maintenance of military materiel.

DoD 4151.15-H, "Depot Maintenance Production Shop Capacity Measurement Handbook," July 1976 is hereby canceled.

This Handbook applies to the Office of the Secretary of Defense, the Military Departments, and the Defense Agencies (hereafter referred to collectively as "the DoD Components").

This Handbook is effective immediately and is mandatory for use by all the DoD Components. The Heads of the DoD Components may issue supplementary instructions when necessary to provide for unique requirements within their respective Components.

Send recommended changes to the Handbook through the appropriate channels to:

Office of the Deputy Under Secretary of Defense for Logistics
Assistant Deputy Under Secretary of Defense for Maintenance Policy,
Programs and Resources
3500 Defense Pentagon
Washington, DC 20301-3500

The DoD Components may obtain copies of this Handbook through their own publication channels. This publication is approved for public release; distribution unlimited. Authorized registered users may obtain copies of this publication from the Defense Technical Information Center, 8725 John J. Kingman Rd., Suite 0944, Fort Belvoir, VA 22060-6218. Other Federal Agencies and the public may obtain copies from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.



John F. Phillips
Deputy Under Secretary
of Defense (Logistics)

TABLE OF CONTENTS

	<u>Page</u>
Foreword	2
Table Of Contents	3
References	5
Definitions	6
CHAPTER 1. APPLICABILITY AND SCOPE	10
Section C1.1. Purpose and Application	10
Section C1.2. Indexes and Computations	10
CHAPTER 2. STANDARD FACTORS	11
Section C2.1. Comparable Base	11
Section C2.2. Calculation Factors	11
CHAPTER 3. CAPACITY	14
Section C3.1. Total Capacity Index	14
Section C3.2. Utilized Capacity Index	16
Section C3.3. Core Capacity Index	16
Section C3.4. Reserve Capacity Index	17
Section C3.5. Required Capacity Index	17
Section C3.6. Excess Capacity Index	17
Section C3.7. Capacity Indexes Relationships	17
Section C3.8. Naval Shipyard Capacity Indexes	18
CHAPTER 4. UTILIZATION INDICATORS	20
Section C4.1. Utilization Index	20
Section C4.2. Peactime Utilization Index	20
Section C4.3. Mission Utilization Index	20
CHAPTER 5. INFORMATION REQUIREMENTS	21
Section C5.1. Records	21
Section C5.2. Reporting Requirements	21

APPENDICES

Appendix 1. Naval Shipyard Output Shops	23
Appendix 2. Capacity Index Determination Flowchart	24
Appendix 3. Depot Capacity and/or Utilization Summary Sheet	25
Appendix 4. Production Shop Categories	26

REFERENCES

- (a) [DoD Directive 4151.18](#), "Maintenance of Military Materiel," August 12, 1992
- (b) [DoD 8910.1-M](#), "DoD Procedures for Management of Information Requirements," November 28, 1986, authorized by [DoD Directive 8910.1](#), June 11, 1993

DL1. DEFINITIONS

DL1.1.1. Annual Paid Hours. The annual work hours per worker, including holidays, for single shift, 40-hour work week for which an employee is paid.

DL1.1.2. Annual Productive Hours. That portion of the annual paid hours per production worker that remains for direct application to the job after subtraction of holidays, leave, training, and other recognized indirect hours.

DL1.1.3. Availability Factor. The percentage of a single-shift work year that work positions can be used to accomplish direct productive work. This factor may include reductions for facility and/or equipment non-availability such as calibration and/or maintenance and/or repairs of real property and shop equipment, utility failure, unscheduled facility closures, and equipment installation and/or rearrangement.

DL1.1.4. Bottleneck. A process in a production flow that restricts the ability to achieve full, single-shift utilization of other processes either preceding or following the bottleneck.

DL1.1.5. Core. Depot maintenance core is the capability maintained within organic Defense depots to meet readiness and sustainability requirements of the weapon systems that support the Chairman of the joint Chiefs of Staff contingency scenarios. Core exists to minimize the operational risks and to guarantee readiness of these weapon systems. Core depot maintenance capabilities will comprise only the minimum facilities, equipment and skilled personnel necessary to ensure a ready and controlled source of required technical competence. The Military Services will use the DoD-approved methodology to compute core depot maintenance requirements.

DL1.1.6. Core Capacity Index. An indicator of the capacity, expressed in Direct Labor Hours (DLH), required by a shop or depot to provide essential maintenance capabilities as calculated in accordance with the approved DoD core methodology.

DL1.1.7. Depot Maintenance. That maintenance performed by designated depot maintenance activities using more extensive shop facilities, equipment, and personnel of higher technical skill than are available at lower levels of maintenance. Depot maintenance normally consists of inspection, test, repair, modification, alteration, modernization, conversion, and rebuilding of parts on assemblies, subassemblies, components, equipment end items, and weapons systems. It includes the manufacture of critical non-available parts and technical assistance to intermediate maintenance organizations, operational units and other activities. Depot maintenance work is

usually accomplished in fixed shops, shipyards and other shore based facilities, or by field teams.

DL1.1.8. Depot Maintenance Activity. An industrial-type facility established to perform depot-level maintenance on ships, aircraft, weapon systems, equipment and components.

DL1.1.9. Direct Labor Hours (DLH). Work performed solely for the benefit of a single job order. It is only incurred during the period of time that benefits accrue solely to that specific job order.

DL1.1.10. Direct Production Worker. A non-supervisory worker whose labor hours are normally charged to specific production work.

DL1.1.11. Excess Capacity. Capacity for which no current or future requirement exists.

DL1.1.12. Excess Capacity Index. An indicator of the capacity, expressed in DLH, which is available in a shop or depot, but not required to support funded workload requirements or provide essential core capabilities.

DL1.1.13. Index. A composite number used to characterize different sets of data. An index determined in accordance with this Handbook is a general indicator rather than a precise measure. Consequently, as index data are aggregated, their significance may decrease.

DL1.1.14. Indirect Labor Hours. All work performed that is not classified as direct.

DL1.1.15. Last Source of Repair. A depot activity designated to perform a specific type of work because there are no other sources available for the type of work concerned.

DL1.1.16. Mission Utilization Rate Index. An indicator, expressed as a percentage, of the degree of alignment between the required capacity index and the total capacity index of a shop or depot.

DL1.1.17. Peacetime Utilization Rate Index. An indicator, expressed as a percentage, of the degree of alignment between the utilized capacity index and the total capacity index of a shop or depot.

DL1.1.18. Product Mix. A combination of heterogeneous workloads usually related to major systems, subsystems, components, stock classes, or items.

DL1.1.19. Required Capacity Index. An indicator of the capacity, expressed in DLH, required by a shop or depot to support funded workload requirements AND provide essential core capabilities.

DL1.1.20. Reserve Capacity. Capacity at shop and depot levels that is not utilized but is retained for sound reasons of military necessity.

DL1.1.21. Reserve Capacity Index. An indicator of the capacity, expressed in DLH, required by a shop or depot to provide essential maintenance capabilities, but not actually utilized to support funded workload requirements as outlined in Chapter 3.

DL1.1.22. Shop. A work center, functional work group, or resource group that contains one or more work stations that perform depot maintenance work.

DL1.1.23. Surge. The act of expanding an existing depot maintenance repair capability to meet increased requirements by adjusting shifts, adding skilled personnel, equipment and/or spares and repair parts to increase the flow of repaired or manufactured materiel to using activities or for serviceable storage.

DL1.1.24. Total Capacity Index. The amount of workload, expressed in actual DLH, that a shop or depot can effectively utilize annually on a single shift, 40-hour week basis while producing the product mix that the shop or depot is designed to accommodate.

DL1.1.25. Utilization Index. An indicator, expressed as a percentage, of the degree of alignment of workload to the designed capacity of a shop or depot.

DL1.1.26. Utilized Capacity Index. An indicator of the capacity, expressed in DLH, required by a shop or depot to support funded workload requirements.

DL1.1.27. Workload. Peacetime maintenance support, expressed in DLH, by year (past years are actual DLH produced; current and future years are DLH projected to be produced), inclusive of funding from all sources (i.e., Operations and Maintenance (O&M), Procurement, and Research Development Testing and Evaluation (RDT&E) appropriations, stock fund, and reimbursables such as other Services and Foreign Military Sales).

DL1.1.28. Work Position. A designated amount of space and equipment that is occupied by a single direct production worker to accomplish assigned tasks on a full-time basis. A work position may include more than one location if the worker moves to other locations to accomplish the assigned tasks.

DL1.1.29. Work Station. The lowest order of equipment and/or process location that requires separate analysis of work flow and function during the capacity index calculation. It will consist of one or more work positions as determined by the criteria in step 2 of the capacity index calculation in this Handbook.

C1. CHAPTER 1

APPLICABILITY AND SCOPE

C1.1. PURPOSE AND APPLICATION

C1.1.1. REISSUANCE AND PURPOSE. This Handbook updates guidance for measurement of the capacity and utilization of DoD organic depot maintenance activities that perform depot-level maintenance of military materiel.

C1.1.2. APPLICABILITY AND SCOPE. This handbook is to be used by all activities and organizations of the DoD Components responsible for the determination and reporting of capacity and utilization information for organic depot maintenance activities.

C1.1.2.1. The techniques in this Handbook are applicable to both covered and uncovered spaces, as defined in Appendix 4., within the confines of the depot maintenance activity. This Handbook does not apply to depot field teams and shops referred to as general shop support in Appendix 4. Organic depot maintenance activities and physical capacities established or retained within the DoD Components are to be kept to the minimum necessary to ensure a ready, controlled source of technical competence and resources to meet military requirements (DoD Directive 4151.18, reference (a)). These activities, then, are to remain in place to provide logistical support for war, emergency, and contingency actions, and are to operate in peacetime in a cost-effective manner.

C1.1.2.2. In addition to prescribing calculation methodologies, this Handbook further establishes and outlines reporting criteria for the DoD Components. Such reporting is prescribed to monitor and support the establishment and retention of essential depot maintenance capability as outlined in DoD Directive 4151.18 (reference (a)).

C1.2. INDEXES AND COMPUTATIONS

C1.2.1. This Handbook provides a methodology to calculate depot maintenance capacity and utilization. It establishes DLH as the basic parameter of capacity, enabling comparisons of capacity and utilization data between activities producing varying product mixes. Expressing capacity in DLH provides an indication of relative size and levels of utilization. Also, shop-level data expressed in DLH can be

aggregated to develop higher-level indicators. All measurements and indicators are presented as indexes rather than precise numbers due to the inherent general nature of the calculations.

C1.2.2. Indexes are defined as composite numbers used to characterize different sets of data. Accordingly, indexes determined in accordance with this Handbook are general indicators rather than precise measures. As index data are aggregated, the significance of the data may decrease. While the indexes are important considerations in making workloading decisions, such decisions must be made as a result of a thorough, detailed analysis of the workloads, facilities, and resources involved.

C2. CHAPTER 2

STANDARD FACTORS

C2.1. COMPARABLE BASE

An objective of this Handbook is to provide methodologies for calculation of comparable data. Consequently, it is necessary that the DoD Components use similar factors as the basis of calculations. The Standard Factors identified in section C2.2., below, shall be used by the DoD Components to ensure comparable data is developed.

C2.2. CALCULATION FACTORS

C2.2.1. ANNUAL PAID HOURS (APHs). For determining annual productive hours, the annual paid DLH will be 2080 per work position.

C2.2.2. ANNUAL PRODUCTIVE HOURS. For capacity and utilization index calculations, the annual productive hours will be 1615 DLH per work position. The calculation of 1615 DLH annual productive hours is derived by using the following formula:

(2080 APHs - 80 hrs Holidays - 270 hrs Leave - 111 hrs Indirect = 1615 Annual Productive Hours)

C2.2.3. AVAILABILITY FACTOR . The percentage of a work year that work positions can be used to accomplish direct productive work is known as the availability factor, and it is expressed in decimal form. This factor includes reductions for facility and equipment non-availability for reasons such as calibration, maintenance, or repairs of real property and shop equipment, utility failure, adverse weather, and equipment installation or rearrangement. For depot capacity and utilization index calculations, the availability factor will be 0.95.

C2.2.4. BOTTLENECKS. Capacity for identified bottlenecks should also be calculated on a one shift basis. In managing depot shop operations, the DoD Components shall attempt to eliminate bottlenecks using standard industrial engineering procedures. Where this is not possible, bottlenecks, whether operated on a single- or multi-shift basis, should be used as pacing factors for structuring and workloading all affected shops.

C3. CHAPTER 3

CAPACITY

C3.1. TOTAL CAPACITY INDEX

C3.1.1. The Total Capacity Index indicates the amount of capacity, expressed in DLH, that a facility can effectively employ annually on a single shift, 40-hour week basis while producing the product mix that the facility is designed to accommodate. Individual shop level Total Capacity Indexes are calculated and then combined to determine the Total Capacity Index of an entire depot facility.

C3.1.2. The following steps outline procedures for calculating the Total Capacity Index at the shop level, to include Shipyard Output Shops (see Appendix 1.). The steps are illustrated in the flowchart at Appendix 2. The formula for Total Capacity Index is:

$$\begin{array}{ccccc} \text{(work positions)} & \times & \text{(availability factor)} & \times & \text{(annual productive hours)} \\ & & (0.95) & & (1615) \end{array}$$

C3.1.2.1. Step 1. Obtain detailed shop layouts that identify the function of each shop, its boundaries, and its equipment and/or work bench locations. Verify and update the layouts to reflect the current product mix. If product mix changes are expected to result in shop reconfiguration(s) during the fiscal year, drawings should be obtained for each specific configuration. In cases where a shop has a fluctuating multi-commodity product mix, it may not be practical to address every possible product mix and a representative shop layout may be used.

C3.1.2.2. Step 2. Determine and identify on the layouts the number of work stations and the work positions in each station. Calculate the number of work positions for each work station. To obtain the number of work positions in the shop, add the totals for the work stations within the shop. Work positions will be identified by the following rationale:

C3.1.2.2.1. If only one person would operate the equipment and/or process, the work station will include the equipment and/or process and be recorded as one work position. Examples are: a work station of several pieces of robotic equipment operated station of several pieces of computer-aided manufacturing equipment operated by one person; and a tire recapping machine operated by one person. In these instances, although the number of pieces of equipment varies from

example to example, there is only one work position because in each case, the work position is operated by one person.

C3.1.2.2.2. If the work station is designed to be operated by more than one person, one work position will be recorded for each person. Examples are engine test cells and radar ranges that are operated by more than one person. In each case, the number of work positions is the maximum number of people by which the work station is designed to be operated.

C3.1.2.2.3. If, under design conditions, a piece of equipment would only be infrequently used, or would support more than one work station, it will not be counted as an individual work position, but will be included in a designated work station and labeled support equipment. Examples are machine shop support equipment, such as lathes and drill presses, that support multiple work stations.

C3.1.2.2.4. If an equipment and /or process is designed to be frequently but not continuously used, it should be included as part of a related work position.

C3.1.2.2.5. For the stall and/or work bay and/or aircraft dock situation, determine the optimum number of people who can effectively work during each phase of the process cycle. The weighted average over the cycle will equal the work position quantity of the work station. An analysis of the product mix and process variations may be necessary to determine this value based on experience and knowledge of the processes involved.

C3.1.2.2.6. Bulk processing work stations, such as plating, chemical cleaning, and heat treating shops, can be regarded as one work station. The work position count of these stations is the number of persons necessary to effectively man the entire work station.

C3.1.2.2.7. If a position is designed to be manned continuously, but is currently vacant because of reduced workload quantity, it shall be counted as a work position.

C3.1.2.2.8. For uncovered areas in which depot maintenance is routinely performed year round on a parked vehicle, such as an aircraft parking apron, the number of work positions is calculated in the same manner as in subparagraph C3.1.2.2.5., above. For uncovered areas in which equipment has been permanently installed, the number of work positions will be determined based on the criteria in subparagraphs C3.1.2.2.1. through C3.1.2.2.7., above.

C3.1.2.2.9. It is recognized that a shop may be reconfigured during the year to accommodate variations in product mix. When this condition exists, the number of work positions for each configuration should be multiplied by the estimated percent of time during the year that the specific configuration will be in place. An analysis of the product mix and process variations may be necessary to determine this value based on experience and knowledge of the processes involved. The resulting products for the different configurations should be added together to arrive at the annual weighted work position count for that shop.

C3.1.2.2.10. Record the number of work positions. When identifying work positions for a future fiscal year, the impact of projected work position changes resulting from programmed Military Construction (MILCON) projects, shop reconfigurations, divestitures, changes in product mix, etc., must be taken into account.

C3.1.2.3. Step 3. Multiply the result of Step 2 above by the Availability Factor (0.95).

C3.1.2.4. Step 4. Multiply the product of Step 3 above by the applicable annual productive hour rate (1615 DLH).

C3.1.2.5. Step 5. Record the shop capacity index and assign a production of shop category to the shop (see Appendix 4.).

C3.2. UTILIZED CAPACITY INDEX

The Utilized Capacity Index is an indicator of the capacity, expressed in DLH, required by a shop or depot to support funded workload requirements. It is equal to the total number of DLH required for a shop or depot to execute funded workload requirements on an annual basis, and may include capacity used to perform non-core work as necessary to satisfy statutory requirements, best value, and last source of repair.

C3.3. CORE CAPACITY INDEX

The Core Capacity Index is an indicator of the capacity, expressed in DLH, required for a shop or depot to provide essential maintenance capabilities as calculated in accordance with the approved DoD core. This includes both core capability that is used and core capability that is held in reserve (described in section C3.4., below).

C3.4. RESERVE CAPACITY INDEX

The Reserve Capacity Index is an indicator of the capacity, expressed in DLH, required by a shop or depot to provide essential maintenance capabilities. It is equal to the total number of core DLH that are NOT being used but are required to support DoD core maintenance requirements computed using the DoD-approved methodology. Reserve capacity is not considered excess capacity. Reserve capacity should be specifically identified at the shop level. Specific rationale for retention of reserve capacity shall be developed by the activity concerned and approved by the respective DoD Component.

C3.5. REQUIRED CAPACITY INDEX

The Required Capacity Index is an indicator of the capacity, expressed in DLH, required by as shop or depot to support funded workload requirements AND provide essential core capabilities. It is calculated by adding the Utilize Capacity Index to the Reserve Capacity Index.

C3.6. EXCESS CAPACITY INDEX

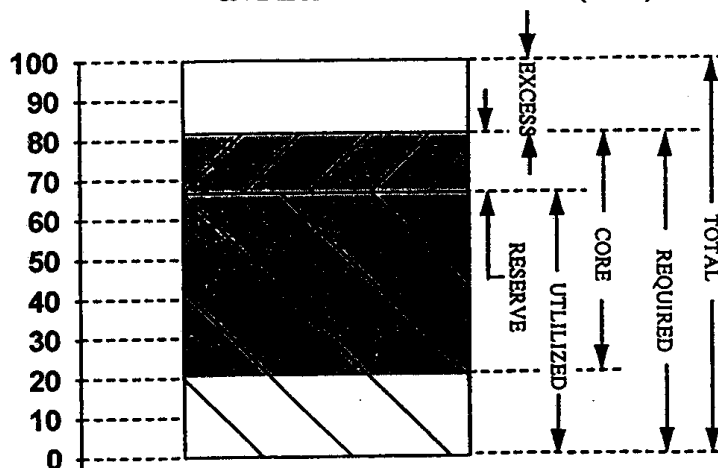
The Excess Capacity Index is an indicator of the capacity, expressed in DLH, that is available in a shop or depot, but for which no requirement exists. It is calculated by subtracting the Required Capacity Index from the Total Capacity Index for the shop or depot concerned. In assessing or reducing excess capacity extreme caution must be exercised. There are cases where a work position will not be fully used, and this unused capacity can not be removed without eliminating the ability to accomplish the workload. As long as there exists a requirement to accomplish a workload, the minimum number of whole work positions must be retained.

C3.7. CAPACITY INDEXES RELATIONSHIPS

The following is an example showing the pictorial relationship of the capacity indexes.

CAPACITY INDEXES

IN DIRECT LABOR HOURS (DLH)



TOTAL CAPACITY INDEX = 100.0
 UTILIZED CAPACITY INDEX = 66.7
 CORE CAPACITY INDEX = 60.7
 RESERVE CAPACITY INDEX = 15.0

REQUIRED CAPACITY INDEX = $66.7 + 15.0 = 81.7$
 EXCESS CAPACITY INDEX = $100.0 - 81.7 = 18.3$

C3.8. NAVAL SHIPYARD CAPACITY INDEXES

C3.8.1. Ship depot maintenance is unique among various DoD depot sectors. Therefore, counting of work positions onboard ship is impractical. The total productive capacity of a naval shipyard is the sum of the capacity index data for Naval Shipyard output shops, as calculated using the procedures outlined in subsection C3.1.2. of this chapter, for the Total Capacity Index at the shop level, and the Drydock Capacity Index data reflected in subsection C3.8.3., below.

C3.8.2. The preponderance of ship depot maintenance is accomplished on ship availabilities that require drydocking (i.e., these availabilities have the largest work packages). The best measurement of shipyard's overall capacity is a combination of Drydock Capacity, or throughput (to capture all ship work), and output shoplevel capacity (to capture the repairables work).

C3.8.3. The Drydock Capacity Index is to be determined by first calculating the maximum ship maintenance capacity for each drydock in each shipyard. For each usable (certified) drydock in a shipyard, the type of assigned ship availability with the largest workload that can be performed in each drydock is identified (e.g., CVNs

loaded into carrier docks). It will be assumed that the drydock will be continually utilized, less the days necessary to maintain the drydock in a full, certified condition, for that type of availability (i.e., as soon as the drydock phase of one availability is complete, the ship is undocked and the next ship docking block workup will commence and then the next ship will be docked); drydock work commences on the second ship while the first ship's availability is completed pierside. The days of programmed annual maintenance for all drydocks are to be subtracted from the maximum days available when computing drydock capacity. The total workload represents all work for an availability, including the drydock phase, the pierside phase and availability related output shop portion. This will be identified in DLH.

C3.8.4. This total is defined as the Drydock Capacity Index and represents the capacity of the shipyard for stapwork when every usable drydock is utilized fully with the largest ship availability type possible.

C3.8.5. The shipyard Total Capacity Index will be computed by adding the Drydock Capacity Index and Shop Level Capacity Index that applies to the output shops.

C4. CHAPTER 4

UTILIZATION INDICATORS

C4.1. UTILIZATION INDEX

The Utilization Index is an indicator, expressed as a percentage, of the degree of alignment between the Utilized Capacity Index or Required Capacity Index and the Total Capacity Index of a shop or depot. Specific Utilization Indexes are calculated for the categories in sections C4.2. and C4.3., below.

C4.2. PEACETIME UTILIZATION INDEX

The Peacetime Utilization Index is an indicator, expressed as a percentage, of the degree of alignment between the Utilized Capacity Index and the Total Capacity Index of a shop or depot. The formula for the Peacetime Utilization Index is:

$$\frac{\text{Utilized Capacity Index}}{\text{Total Capacity Index}} \times 100 = \text{_____} \%$$

The Peacetime Utilization Index will be computed for each depot for the most recent prior year, current year, and 3 planning years. It may also be computed for prior years and the Future Years Defense Program (FYDP) out years.

C4.3. MISSION UTILIZATION INDEX

The Mission Utilization Index is an indicator, expressed as a percentage, of the degree of alignment between the Required Capacity Index and the Total Capacity Index of a shop or depot. The Mission Utilization Index will be computed for each depot for applicable planning year(s) using the following formula:

$$\frac{\text{Required Capacity Index}}{\text{Total Capacity Index}} \times 100 = \text{_____} \%$$

C5. CHAPTER 5

INFORMATION REQUIREMENTS

C5.1. RECORDS

The DoD Components shall identify the level and location for retention of records regarding capacity and utilization data. As a minimum, the following records should be maintained for review and validation of capacity and utilization determination:

C5.1.1. Shop drawings for each shop configuration designating work positions, work station locations, and support equipment.

C5.1.2. Capacity index calculations, including depot level capacity index data sorted by production shop category.

C5.1.3. Identification and classification of reserve capacity along with supporting justification.

C5.1.4. Identification of excess capacity.

C5.1.5. Utilization calculation results as shown in Appendix 3.

C5.1.6. A depot summary of current capacity index and utilization index data in the Appendix 3. format.

C5.2. REPORTING REOUIREMENTS

The reporting requirements defined in this section are designed to provide the Department of Defense with capacity and utilization data on organic depot maintenance activities. Each activity is required to determine the capacity and utilization data using this Handbook, and report this data to the respective DoD Components.

C5.2.1. Each DoD Component shall maintain, in a central location, the data reported under this section in the format defined in Appendix 3. A hard copy report in that format shall be submitted for each depot activity to the Deputy Under Secretary of Defense for Logistics, Attention: Assistant Deputy Under Secretary of Defense for Maintenance Policy, Programs and Resources, within 90 days after the end of each fiscal year. This annual DoD internal reporting requirement has been assigned Report

Control Symbol DD-A&T(A)2008 in accordance with DoD 8910.1-M (reference (b)).

C5.2.2. Capacity data reporting systems shall be designed to provide an audit trail from the depot maintenance activity fiscal year end report to the shop capacity records and data.

C5.2.3. As an integral part of the edit process on the report, a review shall be performed by maintenance or logistics experts to determine the accuracy, completeness, and reasonableness of the data being submitted. The report shall include a narrative analysis of significant changes, developments, information, or trends portrayed by the report. The transmittal memorandum for the report shall identify a point of contact for issues and questions relating to the data being reported.

C5.2.4. Any one-time or additional reports required shall be prescribed by the Office of the Deputy Under Secretary of Defense for Logistics.

C5.2.5. Reporting shall cover a period of the most recent actual (completed) fiscal year, the current (operating and/or budget) year and one planning year. Data for the planning year should reflect the impact of projected capacity changes resulting from programmed MILCON projects, shop reconfigurations, divestitures, changes in product mix, and other related factors. Significant changes should be addressed in the Comments Section of the report. Specific plans for excess capacity should also be addressed.

AP1. APPENDIX 1

NAVAL SHIPYARD OUTPUT SHOPS

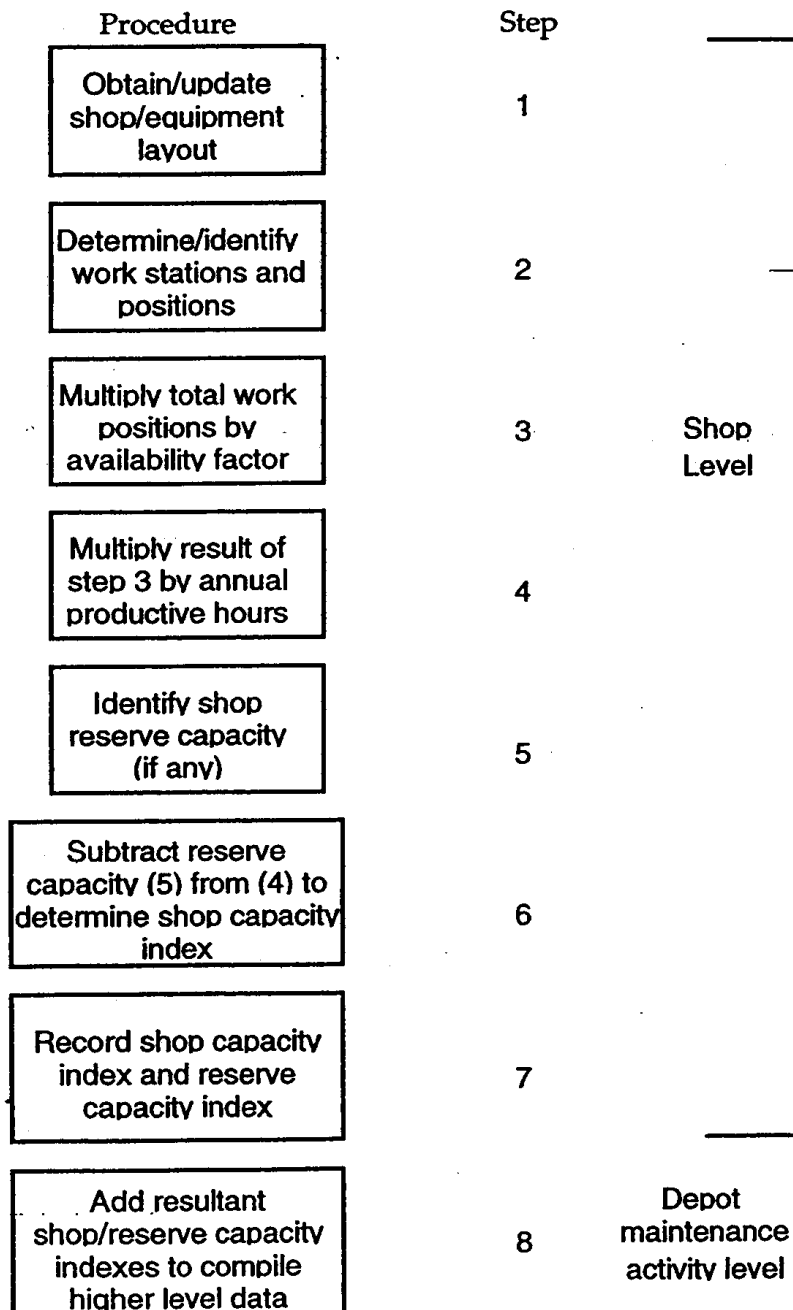
AP1.1.1. Electronics

AP1.1.2. Machine Shop (Inside)

AP1.1.3. Foundry

AP1.1.4. Forge

AP1.1.5. Repairable Work

AP2. APPENDIX 2CAPACITY INDEX DETERMINATION FLOW CHART

AP3. APPENDIX 3

DD FORM 2748, "DEPOT CAPACITY AND/OR UTILIZATION SUMMARY SHEET"

DEPOT CAPACITY AND/OR UTILIZATION SUMMARY SHEET					REPORT CONTROL SYMBOL
1. AS OF					
LOCATION	DOD FISCAL YEARS				
	PAST ACTUAL a.	CURRENT YEAR b.	PLAN YEAR 1 c.	PLAN YEAR 2 d.	PLAN YEAR 3 e.
2. TOTAL DEPOT CAPACITY INDEX (DLH)					
3. UTILIZED CAPACITY INDEX (DLH)					
4. CORE CAPACITY INDEX (DLH)					
5. RESERVE CAPACITY INDEX (DLH)					
6. REQUIRED CAPACITY INDEX (DLH)					
7. EXCESS CAPACITY INDEX (DLH)					
8. PEACETIME UTILIZATION RATE (%)					
9. MISSION UTILIZATION RATE (%)					
NOTE: Capacity data for planning years should reflect the impact of projected capacity changes resulting from programmed MILCON projects, shop reconfigurations, divestitures, changes in product mix, etc.					

DD FORM 2748, DEC 1996

LOCAL REPRODUCTION AUTHORIZED.

AP4. APPENDIX 4

PRODUCTION SHOP CATEGORIES

AP4.1. Aircraft Airframes

AP4.1.1. Airframe. Covered and uncovered areas associated with processing the airframe under these programs commonly identified as progressive aircraft rework, inspect repair as necessary (IRAN), maintenance, crash damage repair and/or overhaul, modernization, modification, etc. The work functions include stripping, disassembly, airframe repair, reassemble, systems check, and refinishing.

AP4.1.2. Other. Those areas used to perform productive work that are not included in category AP4.1.1., above. Includes work performed away from production facility by field teams.

AP4.1.3. General Shop Support. Those covered or uncovered spaces that are second in providing general support to all aircraft production operations. General support includes functions, such as management, supervision, engineering, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing. This category includes offices, cafeterias, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.1.1. and AP4.1.2., above.

AP4.2. Aircraft Components

AP4.2.1. Components. Covered and uncovered areas associated with processing airframe accessories, such as the following:

AP4.2.1.1. Dynamic Components. AH aircraft moving components, such as transmissions, propeller shafts, etc., not otherwise classified.

AP4.2.1.2. Aircraft Structures. Airframe skin, spars, stiffeners, etc., that make up the skeleton and outer shell of the aircraft.

AP4.2.1.3. Hydraulic and/or Pneumatic. Fluid and air pumps and associated plumbing lines and components, air-driven accessories, ram air turbines, fluid-driven accessories, etc. (also includes pneudraulics).

AP4.2.1.4. Instruments. Indicators or measurement devices such as pressure, temperature and humidity gages; air speed, direction, and other flight control instruments; etc.

AP4.2.1.5. Landing Gear. Wheels, strut assemblies, tires, brakes, etc.

AP4.2.1.6. Aviation Ordnance. Delivery systems, such as bomb racks, missile racks and launchers, guns, etc.

AP4.2.1.7. Avionics and/or Electronics. Electronic equipment, such as radar systems, radios, on-board computers, etc.

AP4.2.1.8. APU's (Auxiliary Power Units). On-board systems, not powered by aircraft primary sources, used to supply electrical, hydraulic, or air power for short or temporary periods, such as starting, heating crew and passenger compartments, or emergencies.

AP4.2.2. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to aircraft repair operations by such work functions as parts cleaning; painting and plating; parachute, ordnance, photographic, leather, and fabric repair; machine and metal repair; etc.

AP4.2.3. Other. Those areas used to perform productive work that are not included in categories AP4.2.1. through AP4.2.2., above. Includes work performed away from facility by field teams, etc.

AP4.2.4. General Shop Support. Those covered or uncovered spaces that are second in providing general support to all aircraft production operations. General support includes functions, such as management, supervision, engineering, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing. This category includes offices, cafeterias, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.2.1. through AP4.2.3., above.

AP4.3. Engines (Gas Turbine)

AP4.3.1. Engines. Covered and uncovered areas associated with processing aircraft, ship and tank gas turbine engines and components (other than blades and

vanes) in terms of overhaul, low time, complete repair, and major inspection. The work functions include uncanning, disassembly, cleaning, metals examination, examination and evaluation, parts reconditioning, subassembly, final assembly, test and preservation.

AP4.3.2. Gas Turbine Engines Blades and Vanes. Covered and uncovered areas used with processing gas turbine engine blades and vanes.

AP4.3.3. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to gas turbine engine repair operations by such work functions as parts cleaning, plating, and machine and metal repair.

AP4.3.4. Other. Those areas used to perform productive work that are not included in categories AP4.3.1. through AP4.3.3., above. Includes work performed away from production facility by field teams.

AP4.3.5. General Shop Support. Those covered and uncovered spaces that are used in providing general support to all gas turbine engine production operations. General support includes functions such as management, supervision, engineering, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing. This category includes offices, cafeterias, supervisors work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.3.1. through AP4.3.4., above.

AP4.4. Missiles and Missile Components

AP4.4.1. Strategic Missiles. Covered and uncovered areas associated with processing the strategic missile frames, motors, guidance systems and components, payload systems, accessories and components, and launch equipment.

AP4.4.2. Tactical Missiles. Covered and uncovered areas associated with processing tactical missile frames, solid or liquid propellant, major inspection and modification. The work functions include disassembling, cleaning, propellant examination and evaluation, parts reconditioning, subassembly, final assembly, test and calibration.

AP4.4.3. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to missile repair operations by such work functions as parts cleaning, painting, machine and metal repair, etc.

AP4.4.4. Other. Those areas used to perform productive work that are not included in categories AP4.4.1. through AP4.4.3. above. These include work performed on site by field teams, etc.

AP4.4.5. General Shop Support. Those covered and uncovered spaces that are used in providing general support to missile production operations. General support includes functions, such as management, supervision, engineering, clerical functions, planet maintenance, central or general storage, quality assurance, and materials testing. This category includes offices, cafeterias, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an-integral part of shop areas defined in categories AP4.4.1. through AP4.4.4., above.

AP4.5. Amphibians

AP4.5.1. Vehicles. Covered and uncovered areas used for depot maintenance of complete amphibians. Work functions include repair, overhaul, rebuild, cleaning, disassembly, reassembly, refinishing, systems check, etc.

AP4.5.2. Components. Covered and uncovered areas used for depot maintenance of amphibian hull and/or body, frame-installed systems and power train accessories, and components. Also includes accessories and components of internal combustion engines and armament systems.

AP4.5.3. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to the vehicle repair operations by such work functions as parts cleaning, leather and fabric repair, machine and metal repair, etc.

AP4.5.4. Other. Those areas used to perform productive work that are not included in categories AP4.5.1. through AP4.5.4., above. Includes work performed away from production facility by field teams etc.

AP4.5.5. General Shop Support. Those covered and uncovered spaces that are used in providing general support to amphibian production operations. General

support includes functions such as management, supervision, engineering, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing. This category includes offices, cafeterias, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.5.1. through AP4.5.4., above.

AP4.6. Ground Combat Vehicles

AP4.6.1. Self-propelled. Covered and uncovered areas used for depot maintenance of complete self-propelled artillery vehicles. Work functions include repair, overhaul, rebuild, cleaning, disassembly, reassembly, refinishing, systems check, etc.

AP4.6.2. Tanks. Covered and uncovered areas used for depot maintenance of tanks. Work functions include repair, overhaul, rebuild, cleaning, disassembly, reassembly, systems check, etc.

AP4.6.3. Towed Combat Vehicles. Covered and uncovered areas used for depot maintenance of towed combat vehicles. Work functions include repair, overhaul, rebuild, cleaning, disassembly, reassembly, refinishing, systems check, etc.

AP4.6.4. Components. Covered and uncovered areas used for depot maintenance of combat vehicle hull and/or body, frame, installed systems and power train accessories components. Also includes accessories and components of internal combustion engines and armament systems.

AP4.6.5. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to combat vehicle repair operations by such work functions as parts cleaning, painting and plating, parachute, ordnance, photographic, leather and fabric repair, machine and metal repair, etc.

AP4.6.6. Other. Those areas used to perform productive work that are not included in categories AP4.6.1. through AP4.6.5., above. Includes work performed away from facility by field teams, etc.

AP4.6.7. General Shop Support. Those covered and uncovered spaces that are used in providing general support to combat vehicle production operations. General support includes functions, such as management, supervision, engineering, clerical functions, plant maintenance, central or general storage, quality assurance, and

materials testing. This category includes offices, cafeterias, supervisors' workspace, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.6.1. through AP4.6.6., above.

AP4.7. Ground and Shipboard Communications and Electronic Equipment

AP4.7.1. Radio. Covered and uncovered areas associated with processing radio equipment for overhaul, repair, conversion, and modification that are required in support of fixed, mobile, and portable electronic and communications systems. Categories of equipment include communication, control, navigation, auxiliary, relay, microwave, television, and radiological. Work functions include disassembly, inspection, cleaning, repair, parts reconditioning and/or replacement, manufacture, calibration, reassembly and test.

AP4.7.2. Radar. Covered and uncovered areas associated with processing radar equipment for overhaul, repair, conversion, and modification that are required in support of fixed, mobile, and portable electronic and communication systems. Radar equipment categories include navigation, search, surveillance, height finding and identification. Work functions include disassembly, inspection, cleaning, repair, parts reconditioning and/or replacement, manufacture, calibration, reassembly, test and alignment.

AP4.7.3. Wire and Communications. Covered and uncovered areas associated with processing wire and communications equipment for overhaul, repair, conversion, rehabilitation and modification that are required in support of fixed, mobile, and portable electronic and communication systems. Wire and Communications categories of equipment include teletype, facsimile, telephone and telegraph, intercom and public address systems, sound recording and reproduction, visible and invisible light communication, and cryptological.

AP4.7.4. Electronic Warfare. Covered and uncovered areas associated with processing electronic warfare equipment.

AP4.7.5. Navigational Aids. Covered and uncovered areas associated with processing of navigational aids.

AP4.7.6. Electro-Optics and/or Night Vision. Covered and uncovered areas associated with processing of electro-optics and night vision equipment.

AP4.7.7. Satellite Control and/or Space Sensors. Covered and uncovered areas associated with processing of satellite control and space sensor equipment.

AP4.7.8. Crypto. Covered and uncovered areas associated with processing of crypto equipment.

AP4.7.9. Other (including computers). Covered and uncovered areas to perform depot maintenance on other types of communications-electronics equipment, including computers. Also includes work performed away from production facility by field teams.

AP4.7.10. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to communications-electronics equipment repair operations by such work functions as painting, plating, cleaning, welding, machine shop operations, metal and woodworking, canvas and upholstery repair, and plastic, graphic arts and other repair efforts, associated with the electronic and communications equipment.

AP4.7.11. General Shop Support. Those covered and uncovered spaces that are used in providing general support to electronics and communications production operations. General support includes functions such as management, supervision, engineering, clerical functions, plant maintenance, central or general storage, quality assurance and materials testing. This category includes offices, cafeterias, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.7.1. through AP4.7.10., above.

AP4.8. Automotive and/or Construction Equipment

AP4.8.1. Vehicles and Components. Covered and uncovered areas used for depot maintenance of complete automotive and/or construction vehicles and their components (less communications-electronics). Work functions include repair, overhaul, rebuild, cleaning, disassembly, reassembly, refinishing, systems check, etc.

AP4.8.2. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to the vehicle repair operation by such work functions as parts cleaning, painting and plating, leather and fabric repair, machine and metal repair, etc.

AP4.8.3. Other. Those areas used to perform productive work that are not included in categories AP4.8.1. and AP4.8.2., above. Includes work performed away from the production facility by field teams.

AP4.8.4. General Shop Support. Those covered and uncovered areas that are used in providing general support to all vehicle production operations. General support includes such functions as management, supervision, engineering, production control, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing, etc. This category include offices, cafeterias, libraries, supervisors' workspace, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facility, etc., that are an integral part of shop areas defined in categories AP4.8.1. through AP4.8.3., above.

AP4.9. Tactical Vehicles

AP4.9.1. Tactical Automotive Vehicles. Covered and uncovered areas for depot maintenance of complete tactical automotive vehicles. Work functions include repair, overhaul, rebuild, cleaning, disassembly, reassembly, refinishing, systems check, etc.

AP4.9.2. Components. Covered and uncovered areas for depot maintenance of hull and/or body, frame, installed systems, power train accessories, and components. Also includes accessories and components of engines and armament systems.

AP4.9.3. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to vehicle equipment repair operation by such work functions as parts cleaning, painting, plating, leather and fabric repair, machine and metal repair, etc.

AP4.9.4. Other. Those areas used to perform productive work that are not included in categories AP4.9.1. through AP4.9.3., above. Includes work performed away from the production facility by field teams.

AP4.9.5. General Shop Support. Those covered and uncovered areas that are used in providing general support to tactical vehicle production operations. General support includes such functions as management, supervision, engineering, production control, clerical functions, plant maintenance central or general storage, quality assurance, and materials testing, etc. This category includes offices, cafeterias, libraries, supervisors' work space, shop parts storage areas, main aisles, wash and

dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.9.1. through A4.9.4., above.

AP4.10. Ground General Purpose

AP4.10.1. Ground Support Equipment. Covered and uncovered areas associated with depot maintenance of ground support equipment (except aircraft and communications-electronics) and its accessories and components.

AP4.10.2. Ground Generators. Covered and uncovered areas associated with the depot maintenance of ground generators and their accessories and components.

AP4.10.3. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to ground general purpose repair operations, by such work functions as painting and plating, machine and metal repair, etc.

AP4.10.4. Other. Those areas used to perform productive work that are not included in categories AP4.10.1. through AP4.10.3., above. Includes work performed away from the production facility by field teams.

AP4.10.5. General Shop Support. Those covered and uncovered areas that are used in providing general support to all ground general purpose equipment production operations. General support includes functions as management supervision, engineering, production control, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing, etc. This category includes offices, cafeterias, libraries, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.10.1. through AP4.10.4., above.

AP4.11. Ordnance, Weapons, and Munitions

AP4.11.1. Nuclear Weapons. Covered and uncovered areas associated with renovation, modification, repair, inspection, test, assembly, and demilitarization of nuclear weapon materiel.

AP4.11.2. Chemical and Bacteriological. Covered and uncovered areas associated with renovation, modification, repair, inspection, test, assembly and demilitarization of chemical and bacteriological weapons, and associated materiel.

AP4.11.3. Conventional Arms and Explosives. Covered and uncovered areas associated with renovation, modification, repair, inspection, test, assembly and demilitarization of all items of conventional, ammunition and explosives, including bombs, grenades, weapon warheads, rockets, mines, torpedoes, pyrotechnics, fuses, primers, etc.

AP4.11.4. Small Arms. Covered and uncovered areas associated with modification, repair, inspection, test, assembly, and demilitarization of small arms, including all hand-held weapons, bayonets, and associated materiel.

AP4.11.5. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to ordnance, weapons and munitions repair operations by such work functions as painting and plating, and machine and metal repair, etc.

AP4.11.6. Other. Those areas used to perform productive work that are not included in categories AP4.11.1. through AP4.11.5., above. Includes work performed away from the production facility by field teams.

AP4.11.7. General Shop Support. Those covered and uncovered areas that are used in production operations. General support includes functions as management supervision, engineering, production control, clerical functions, plant maintenance, central or general storage, quality assurance, and materials testing, etc. This category includes offices, cafeterias, libraries, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.11.1. through AP4.11.6., above.

AP4.12. Sea Systems

AP4.12.1. Ships. Covered and uncovered areas associated with the following: central tool shop, shipfitting, sheet metal, forge and heat treating, welding, inside machining, marine machining, boilermaking, electrical, pipefitting, woodworking, painting and blasting, riggings, foundry, pattern making, and temporary services.

AP4.12.2. Weapons. Covered and uncovered areas associated with the repair, overhaul, alignment, installation, checkout and test of all weapons systems and integrated systems (gun mounts, turrets, saluting batteries, and launching pads). Work functions include repair overhaul and testing of gunsights, range finders, torpedo

directors, telescopic sights, periscopes, binoculars, stereo trainers, and other miscellaneous repair of instruments, etc.

AP4.13. Software

AP4.13.1. Tactical Systems. Covered and uncovered areas used for depot maintenance of tactical systems software.

AP4.13.2. Support Equipment. Covered and uncovered areas used for depot maintenance of support equipment software.

AP4.13.3. General Support. Those covered and uncovered areas that are used in production operations. General support includes functions as management supervision, engineering, production control, clerical functions, plant maintenance, central or general storage, quality assurance, materials testing, etc. This category includes offices, cafeterias, libraries, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.13.1. and AP4.13.2., above.

AP4.14. Special Interest Items

AP4.14.1. Bearings Refurbishment. Covered and uncovered areas used for depot maintenance of all types of bearings.

AP4.14.2. Calibration (Type 1). Covered and uncovered areas used to perform Type 1 calibration on all types of equipment.

AP4.14.3. Test Measurement and Diagnostic Equipment (TMDE). Covered and uncovered areas used for depot maintenance of TMDE equipment.

AP4.14.4. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to special interest item repair operations by such work functions as painting and plating, rubber products fabrication, machine and metal repair, etc.

AP4.14.5. Other. Those areas used to perform productive work that are not included in categories AP4.14.1. through AP4.14.4., above. Includes work performed in other than covered areas and that are performed away from the production facility by field teams.

AP4.14.6. General Shop Support. Those covered and uncovered areas that are used in production operations. General support includes functions as management supervision, engineering, production control, clerical functions, plant maintenance, central or general storage, quality assurance, materials testing, etc. This category includes offices, cafeterias, libraries, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.14.1. through AP4.14.5., above.

AP4.15. Other

AP4.15.1. Other Items. Covered and uncovered areas used for depot maintenance of items not identified in categories AP4.1. through AP4.14., above.

AP4.15.2. Repair. Covered and uncovered areas that are not an integral part of other categories previously prescribed, and that contribute to repair operations by such work functions as painting and plating, and machine and metal repair.

AP4.15.3. Other. Those areas used to perform productive work that are not included in categories AP4.15.1. through AP4.15.2., above. Includes work performed away from the production facility by field teams.

AP4.15.4. General Shop Support. Those covered and uncovered areas that are used in production operations. General support includes functions as management supervision, engineering, production control, clerical functions, plant maintenance, central or general storage, quality assurance, materials testing, etc. This category includes offices, cafeterias, libraries, supervisors' work space, shop parts storage areas, main aisles, wash and dressing areas, dispatching facilities, inspection facilities, etc., that are an integral part of shop areas defined in categories AP4.15.1. through AP4.15.3., above.

AP4.16. Associated Fabrication and/or Manufacturing

Covered and uncovered areas associated with fabrication and/or manufacturing in support of depot maintenance of the items in categories AP4.1. through AP4.15., above.